

Original Research

Evaluation of efficacy of two root canal sealers for root canal therapy

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ABSTRACT:

Background: To evaluate the efficacy of two root canal sealers for root canal therapy. **Materials & methods:** A total of 40 molars were enrolled. The age group included was 25- 45 years. Teeth were divided into two groups of 20 teeth each based on the type of root canal sealers used. All the molars were evaluated clinically and radiographically at regular intervals.

Results: A total of 40 teeth were enrolled. The mean dye leakage was evaluated. In group I, mean dye leakage was 33.8 and in group II, the mean dye leakage was 7.6. On comparing the areas at baseline in group I, the value was 8.46 whereas in group II, it is 9.09. The areas at 6 months in group I was 5.05 and in group II was 6.22. **Conclusion:** Resin cement sealed the root canals significantly better when compared with zinc oxide eugenol.

Keywords: root canal therapy, root canal sealer, zinc oxide eugenol.

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INTRODUCTION

Successful root canal treatment depends on proper cleaning, disinfecting and shaping of the root canal space, followed by proper obturation. Root canal treatment has been generally correlated with decrease in tooth strength. During the process of root canal treatment dentin microhardness is one of the strength properties which are changed. This might be due to compositional changes linked with caries process, pulpectomy and the application of restorative materials.¹⁻³ An ideal root canal sealer should have low viscosity, good wetting properties, leaking resistance to promote improved sealing thus maintaining the bacteria inactive,⁴ thin film thickness, low surface tension to flow into the irregularities and spaces between the gutta-percha cones and root canal and good adhesion (Grossman and Branstetter and Fraunhofer).^{5,6} Different sealer formulations have been subjected to extensive research with respect to their mechanical and biological properties, reflecting that the appropriate selection of a sealer and its clinical performance may influence the clinical outcome.⁷

Due to the complexity of root canal systems, pulp tissue and inorganic debris remain in areas

instruments and irrigation solutions cannot easily access after root canal treatments. Thus, microorganisms surviving in the root canal will subsequently grow and spread to the periradicular areas between the sealer and dentin.⁸ Permanent coronal restorations also provide seals equally as important as the apical seal after the root canals are filled.⁹ When insufficient coronal sealing occurs or the root canal remains open (e.g., when sealing is delayed for permanent fillings, broken fillings, or secondary caries formation; etc), oral bacteria will access the apical foramen.¹⁰ It is not easy to achieve a complete filling with the current root-filling materials used in the clinic, due to the dimensional changes and lack of adhesion from gutta-percha, which is also the reason to use endodontic sealers in combination of gutta-percha. Thus, the adaptability of a sealer to the dentin is the primary factor influencing microleakage and reinfection of the root canal.¹¹ Epoxy resin sealers like AH Plus was found to bond better to the core obturation material and root dentine.¹² They have the advantages such as less shrinkage, high radio opacity, low solubility, better periapical repair and biocompatibility.¹³ Studies have evaluated the success of root canal treatment, the incidence of pain and

healing ability and many other aspects of the root canal sealers both in vivo and in vitro. Evaluation of post-operative pain with visual analogue scale (VAS), periapical healing with periapical index (PAI) are widely used methods and morphometric evaluation with VixWin Pro digital image analysis software is a new, reliable and accurate technique. Hence, this study was conducted to evaluate the efficacy of two root canal sealers for root canal therapy.

MATERIALS & METHODS

A total of 40 molars were enrolled. The age group included was 25- 45 years. Teeth were divided into two groups of 20 teeth each based on the type of root canal sealers used. All the molars were evaluated clinically and radiographically at regular intervals.

Group I: Zinc oxide eugenol

Group II: Resin cement

The samples from all the two groups were obturated with gutta-percha as core material with respective sealers using a cold lateral condensation technique. Medical history was taken. Data was collected and result was analysed using SPSS software. Chi square test was done. $P < 0.05$ was considered as statistically significant.

RESULTS

A total of 40 teeth were enrolled. The mean dye leakage was evaluated. In group I, mean dye leakage was 33.8 and in group II, the mean dye leakage was 7.6. On comparing the areas at baseline in group I, the value was 8.46 whereas in group II, it is 9.09. The areas at 6 months in group I was 5.05 and in group II was 6.22.

Table 1: comparison of groups

Groups	Mean (dye leakage)	Standard deviation
Group I- Zinc oxide eugenol	33.8	7.54
Group II- Resin cement	7.6	7.22

Table 2: comparison of area at baseline and at 6 months

Groups	Area at baseline	Area at 6 months
Group I	8.46	5.05
Group II	9.09	6.22

DISCUSSION

Invasion of microorganisms into the pulp is responsible for the pathogenesis and necrosis of the vital tissue. ¹⁴Elimination of infection from the root canal system followed by its maintenance was found to induce healing. Root canal sealers along with obturation material will provide a bacteria proof seal of the root canal system, preventing the leeway space and communications between the intracanal and extracanal environments. ¹⁵Root canal sealers leak to some extent, and most leakage occurs between the root canal walls and the sealer, but its use was found to significantly reduce apical leakage. A wide variety of root canal sealers are available, such as cements based on zinc oxide eugenol, calcium hydroxide, glass ionomer and epoxy resins. ^{16,17}At present, sealers based on epoxy resin afford very good physical properties with excellent apical sealing, and ensure adequate biological performance, but had problems in working properties, radiopacity and retreatability. ^{18,19} Hence, this study was conducted to evaluate the efficacy of two root canal sealers for root canal therapy.

In the present study, a total of 40 teeth were enrolled. The mean dye leakage was evaluated. In group I, mean dye leakage was 33.8 and in group II, the mean dye leakage was 7.6. A study by Kumar NS et al, studied fifty freshly extracted mandibular first premolars and sectioned at the cemento-enamel junction. Group I teeth were obturated with methacrylate resin-based sealer (EnoRez) and Group II teeth were obturated with epoxy resin-based sealer

(AH Plus). Both the sealers produced apical leakage to a certain extent. The adaptation and resin sealer penetration in the coronal and middle thirds was better than in the apical third of the root canal under SEM observation. The hybridized resin sealer tags in the coronal and middle thirds of Group I were much longer than that shown by Group II. ²⁰

In the present study, on comparing the areas at baseline in group I, the value was 8.46 whereas in group II, it is 9.09. The areas at 6 months in group I was 5.05 and in group II was 6.22. Another study by Khallaf ME et al studied forty two single rooted teeth were selected and divided into 3 equal groups; Apexit, iRootSP and control groups (n=14) Each group was then divided into 2 subgroups according to the post evaluation period; 1 week and 2 months (n=7). Root canal procedure was done in the experimental groups and obturation was made using either; Apexit, iRootSP or left unprepared and unobturated in the control group. Roots were sectioned transversely into cervical, middle and apical segments. The three sections of each root were mounted in a plastic chuck with acrylic resin. The coronal dentin surfaces of the root segments were polished. Microhardness of each section was measured at 500 μm and 1000 μm from the canal lumen. Among iRootSP groups there was a statistically significant difference between iRoot SP at coronal root portion (87.79 ± 17.83) and iRoot SP at apical root portion (76.26 ± 9.33) groups where ($p=0.01$). iRoot SP at coronal canal third had higher statistically significant mean microhardness value (87.79 ± 17.83) compared to Apexit at coronal third

(73.61±13.47) where (p=0.01).²¹The successful root canal treatment requires three-dimensional obturation of the root canal system with nonirritating biomaterials. The majority of endodontic failures are attributed to the incomplete sealing of the root canals.²² Thus, it is necessary to use materials, which will be able to create fluid tight seal between the root canal system and the periapical tissues.²³

CONCLUSION

Resin cement sealed the root canals significantly better when compared with zinc oxide eugenol.

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